Key Terms

alpha wave type of relatively low frequency, relatively high amplitude brain wave that becomes synchronized; characteristic of the beginning of stage 1 sleep

biological rhythm internal cycle of biological activity

cataplexy lack of muscle tone or muscle weakness, and in some cases complete paralysis of the voluntary muscles

central sleep apnea sleep disorder with periods of interrupted breathing due to a disruption in signals sent from the brain that regulate breathing

circadian rhythm biological rhythm that occurs over approximately 24 hours

codeine opiate with relatively low potency often prescribed for minor pain

cognitive-behavioral therapy psychotherapy that focuses on cognitive processes and problem behaviors that is sometimes used to treat sleep disorders such as insomnia

collective unconscious theoretical repository of information shared by all people across cultures, as described by Carl Jung

consciousness awareness of internal and external stimuli

continuous positive airway pressure (CPAP) device used to treat sleep apnea; includes a mask that fits over the sleeper's nose and mouth, which is connected to a pump that pumps air into the person's airways, forcing them to remain open

delta wave type of low frequency, high amplitude brain wave characteristic of stage 3 and stage 4 sleep

depressant drug that tends to suppress central nervous system activity

euphoric high feelings of intense elation and pleasure from drug use

evolutionary psychology discipline that studies how universal patterns of behavior and cognitive processes have evolved over time as a result of natural selection

hallucinogen one of a class of drugs that results in profound alterations in sensory and perceptual experiences, often with vivid hallucinations

homeostasis tendency to maintain a balance, or optimal level, within a biological system

hypnosis state of extreme self-focus and attention in which minimal attention is given to external stimuli

insomnia consistent difficulty in falling or staying asleep for at least three nights a week over a month's time

jet lag collection of symptoms brought on by travel from one time zone to another that results from the mismatch between our internal circadian cycles and our environment

K-complex very high amplitude pattern of brain activity associated with stage 2 sleep that may occur in response to environmental stimuli

latent content hidden meaning of a dream, per Sigmund Freud's view of the function of dreams

lucid dream people become aware that they are dreaming and can control the dream's content

manifest content storyline of events that occur during a dream, per Sigmund Freud's view of the function of dreams

meditation clearing the mind in order to achieve a state of relaxed awareness and focus

melatonin hormone secreted by the endocrine gland that serves as an important regulator of the sleep-wake cycle

meta-analysis study that combines the results of several related studies

methadone clinic uses methadone to treat withdrawal symptoms in opiate users

methadone synthetic opioid that is less euphorogenic than heroin and similar drugs; used to manage withdrawal symptoms in opiate users

methamphetamine type of amphetamine that can be made from pseudoephedrine, an over-the-counter drug; widely manufactured and abused

narcolepsy sleep disorder in which the sufferer cannot resist falling to sleep at inopportune times

night terror sleep disorder in which the sleeper experiences a sense of panic and may scream or attempt to escape from the immediate environment

non-REM (NREM) period of sleep outside periods of rapid eye movement (REM) sleep

obstructive sleep apnea sleep disorder defined by episodes when breathing stops during sleep as a result of blockage of the airway

opiate/opioid one of a category of drugs that has strong analgesic properties; opiates are produced from the resin of the opium poppy; includes heroin, morphine, methadone, and codeine

parinsomnia one of a group of sleep disorders characterized by unwanted, disruptive motor activity and/or experiences during sleep

physical dependence changes in normal bodily functions that cause a drug user to experience withdrawal symptoms upon cessation of use

pineal gland endocrine structure located inside the brain that releases melatonin

psychological dependence emotional, rather than a physical, need for a drug which may be used to relieve psychological distress

REM sleep behavior disorder (RBD) sleep disorder in which the muscle paralysis associated with the REM sleep phase does not occur; sleepers have high levels of physical activity during REM sleep, especially during disturbing dreams

rapid eye movement (REM) sleep period of sleep characterized by brain waves very similar to those during wakefulness and by darting movements of the eyes under closed eyelids

restless leg syndrome sleep disorder in which the sufferer has uncomfortable sensations in the legs when trying to fall asleep that are relieved by moving the legs

rotating shift work work schedule that changes from early to late on a daily or weekly basis

sleep apnea sleep disorder defined by episodes during which breathing stops during sleep

sleep debt result of insufficient sleep on a chronic basis

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sleep rebound sleep-deprived individuals will experience longer sleep latencies during subsequent opportunities for sleep

sleep regulation brain's control of switching between sleep and wakefulness as well as coordinating this cycle with the outside world

sleep spindle rapid burst of high frequency brain waves during stage 2 sleep that may be important for learning and memory

sleep state marked by relatively low levels of physical activity and reduced sensory awareness that is distinct from periods of rest that occur during wakefulness

sleepwalking (also, somnambulism) sleep disorder in which the sleeper engages in relatively complex behaviors

stage 1 sleep first stage of sleep; transitional phase that occurs between wakefulness and sleep; the period during which a person drifts off to sleep

stage 2 sleep second stage of sleep; the body goes into deep relaxation; characterized by the appearance of sleep spindles

stage 3 sleep third stage of sleep; deep sleep characterized by low frequency, high amplitude delta waves

stage 4 sleep fourth stage of sleep; deep sleep characterized by low frequency, high amplitude delta waves

stimulant drug that tends to increase overall levels of neural activity; includes caffeine, nicotine, amphetamines, and cocaine

sudden infant death syndrome (SIDS) infant (one year old or younger) with no apparent medical condition suddenly dies during sleep

suprachiasmatic nucleus (SCN) area of the hypothalamus in which the body's biological clock is located

theta wave type of low frequency, low amplitude brain wave characteristic of the end of stage 1 sleep

tolerance state of requiring increasing quantities of the drug to gain the desired effect

wakefulness characterized by high levels of sensory awareness, thought, and behavior

withdrawal variety of negative symptoms experienced when drug use is discontinued

Summary

4.1 What Is Consciousness?

States of consciousness vary over the course of the day and throughout our lives. Important factors in these changes are the biological rhythms, and, more specifically, the circadian rhythms generated by the suprachiasmatic nucleus (SCN). Typically, our biological clocks are aligned with our external environment, and light tends to be an important cue in setting this clock. When people travel across multiple time zones or work rotating shifts, they can experience disruptions of their circadian cycles that can lead to insomnia, sleepiness, and decreased alertness. Bright light therapy has shown to be promising in dealing with circadian disruptions. If people go extended periods of time without sleep, they will accrue a sleep debt and potentially experience a number of adverse psychological and physiological consequences.

4.2 Sleep and Why We Sleep

We devote a very large portion of time to sleep, and our brains have complex systems that control various aspects of sleep. Several hormones important for physical growth and maturation are secreted during sleep. While the reason we sleep remains something of a mystery, there is some evidence to suggest that sleep is very important to learning and memory.

4.3 Stages of Sleep

The different stages of sleep are characterized by the patterns of brain waves associated with each stage. As a person transitions from being awake to falling asleep, alpha waves are replaced by theta waves. Sleep spindles and K-complexes emerge in stage 2 sleep. Stage 3 and stage 4 are described as slow-wave sleep that is marked by a predominance of delta waves. REM sleep involves rapid movements of the eyes, paralysis of voluntary muscles, and dreaming. Both NREM and REM sleep appear to play important roles in learning and memory. Dreams may represent life events that are important to the dreamer. Alternatively, dreaming may represent a state of protoconsciousness, or a virtual reality, in the mind that helps a person during consciousness.

4.4 Sleep Problems and Disorders

Many individuals suffer from some type of sleep disorder or disturbance at some point in their lives. Insomnia is a common experience in which people have difficulty falling or staying asleep. Parasomnias involve unwanted motor behavior or experiences throughout the sleep cycle and include RBD, sleepwalking, restless leg syndrome, and night terrors. Sleep apnea occurs when individuals stop breathing during their sleep, and in the case of sudden infant death syndrome, infants will stop breathing during sleep and die. Narcolepsy involves an irresistible urge to fall asleep during waking hours and is often associated with cataplexy and hallucination.

4.5 Substance Use and Abuse

Substance use disorder is defined in DSM-5 as a compulsive pattern of drug use despite negative consequences. Both physical and psychological dependence are important parts of this disorder. Alcohol, barbiturates, and benzodiazepines are central nervous system depressants that affect GABA neurotransmission. Cocaine, amphetamine, cathinones, and MDMA are all central nervous stimulants that agonize dopamine neurotransmission, while nicotine and caffeine affect acetylcholine and adenosine, respectively. Opiate drugs serve as powerful analgesics through their effects on the endogenous opioid neurotransmitter system, and hallucinogenic drugs cause pronounced changes in sensory and perceptual experiences. The hallucinogens are variable with regards to the specific neurotransmitter systems they affect.

4.6 Other States of Consciousness

Hypnosis is a focus on the self that involves suggested changes of behavior and experience. Meditation involves relaxed, yet focused, awareness. Both hypnotic and meditative states may involve altered states of consciousness that have potential application for the treatment of a variety of physical and psychological disorders.

Review Questions

1. The body's biological clock is located in the _____.

a. hippocampus
b. thalamus
c. hypothalamus
d. pituitary gland

2. _____ occurs when there is a chronic deficiency in sleep.

a. jet lag
b. rotating shift work
c. circadian rhythm
d. sleep debt

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3. _____ cycles occur roughly once every 24 hours.
a. biological
b. circadian
c. rotating
d. conscious

4. _____ is one way in which people can help reset their biological clocks.
a. Light-dark exposure
b. coffee consumption
c. alcohol consumption
d. napping

5. Growth hormone is secreted by the _____ while we sleep.
a. pineal gland
b. thyroid
c. pituitary gland
d. pancreas

6. The _____ plays a role in controlling slow-wave sleep.
a. hypothalamus
b. thalamus
c. pons
d. both a and b

7. _____ is a hormone secreted by the pineal gland that plays a role in regulating biological rhythms and immune function.
a. growth hormone
b. melatonin
c. LH
d. FSH

8. _____ appears to be especially important for enhanced performance on recently learned tasks.
a. melatonin
b. slow-wave sleep
c. sleep deprivation
d. growth hormone

9. _____ is(are) described as slow-wave sleep.
a. stage 1
b. stage 2
c. stage 3 and stage 4
d. REM sleep

10. Sleep spindles and K-complexes are most often associated with _____ sleep.
a. stage 1
b. stage 2
c. stage 3 and stage 4
d. REM

11. Symptoms of _____ may be improved by REM deprivation.
a. schizophrenia
b. Parkinson's disease
c. depression
d. generalized anxiety disorder

12. The _____ content of a dream refers to the true meaning of the dream.
a. latent
b. manifest
c. collective unconscious
d. important

13. _____ is loss of muscle tone or control that is often associated with narcolepsy.
a. RBD
b. CPAP
c. cataplexy
d. insomnia

14. An individual may suffer from _____ if there is a disruption in the brain signals that are sent to the muscles that regulate breathing.
a. central sleep apnea
b. obstructive sleep apnea
c. narcolepsy
d. SIDS

15. The most common treatment for _____ involves the use of amphetamine-like medications.
a. sleep apnea
b. RBD
c. SIDS
d. narcolepsy

16. _____ is another word for sleepwalking.
a. insomnia
b. somnambulism
c. cataplexy
d. narcolepsy

17. _____ occurs when a drug user requires more and more of a given drug in order to experience the same effects of the drug.
a. withdrawal
b. psychological dependence
c. tolerance
d. reuptake

18. Cocaine blocks the reuptake of _____.
a. GABA
b. glutamate
c. acetylcholine
d. dopamine

19. _____ refers to drug craving.
a. psychological dependence
b. antagonism
c. agonism
d. physical dependence

20. LSD affects _____ neurotransmission.
a. dopamine
b. serotonin
c. acetylcholine
d. norepinephrine

21. _____ is most effective in individuals that are very open to the power of suggestion.
a. hypnosis
b. meditation
c. mindful awareness
d. cognitive therapy

22. _____ has its roots in religious practice.
a. hypnosis
b. meditation
c. cognitive therapy
d. behavioral therapy

23. Meditation may be helpful in _____.
a. pain management
b. stress control
c. treating the flu
d. both a and b

24. Research suggests that cognitive processes, such as learning, may be affected by _____.
a. hypnosis
b. meditation
c. mindful awareness
d. progressive relaxation

Critical Thinking Questions

25. Healthcare professionals often work rotating shifts. Why is this problematic? What can be done to deal with potential problems?

26. Generally, humans are considered diurnal which means we are awake during the day and asleep during the night. Many rodents, on the other hand, are nocturnal. Why do you think different animals have such different sleep-wake cycles?

27. If theories that assert sleep is necessary for restoration and recovery from daily energetic demands are correct, what do you predict about the relationship that would exist between individuals' total sleep duration and their level of activity?

28. How could researchers determine if given areas of the brain are involved in the regulation of sleep?

29. Differentiate the evolutionary theories of sleep and make a case for the one with the most compelling evidence.

30. Freud believed that dreams provide important insight into the unconscious mind. He maintained that a dream's manifest content could provide clues into an individual's unconscious. What potential criticisms exist for this particular perspective?

31. Some people claim that sleepwalking and talking in your sleep involve individuals acting out their dreams. Why is this particular explanation unlikely?

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32. One of the recommendations that therapists will make to people who suffer from insomnia is to spend less waking time in bed. Why do you think spending waking time in bed might interfere with the ability to fall asleep later?

33. How is narcolepsy with cataplexy similar to and different from REM sleep?

34. The negative health consequences of both alcohol and tobacco products are well-documented. A drug like marijuana, on the other hand, is generally considered to be as safe, if not safer than these legal drugs. Why do you think marijuana use continues to be illegal in many parts of the United States?

35. Why are programs designed to educate people about the dangers of using tobacco products just as important as developing tobacco cessation programs?

36. What advantages exist for researching the potential health benefits of hypnosis?

37. What types of studies would be most convincing regarding the effectiveness of meditation in the treatment for some type of physical or mental disorder?

Personal Application Questions

38. We experience shifts in our circadian clocks in the fall and spring of each year with time changes associated with daylight saving time. Is springing ahead or falling back easier for you to adjust to, and why do you think that is?

39. What do you do to adjust to the differences in your daily schedule throughout the week? Are you running a sleep debt when daylight saving time begins or ends?

40. Have you (or someone you know) ever experienced significant periods of sleep deprivation because of simple insomnia, high levels of stress, or as a side effect from a medication? What were the consequences of missing out on sleep?

41. Researchers believe that one important function of sleep is to facilitate learning and memory. How does knowing this help you in your college studies? What changes could you make to your study and sleep habits to maximize your mastery of the material covered in class?

42. What factors might contribute to your own experiences with insomnia?

43. Many people experiment with some sort of psychoactive substance at some point in their lives. Why do you think people are motivated to use substances that alter consciousness?

44. Under what circumstances would you be willing to consider hypnosis and/or meditation as a treatment option? What kind of information would you need before you made a decision to use these techniques?

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